



Weston Solutions, Inc.  
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1903851 - R8 SDMS

October 27, 2017~~October 25, 2017~~

Pete Stevenson  
On-Scene Coordinator  
United States Environmental Protection Agency, Region 8  
Mail Code: 8EPR-ER  
1595 Wynkoop Street  
Denver, CO 80202

Re: Illinois Gulch RS Site – Trip Report  
Breckenridge, Summit County, Colorado  
TDD: 0001/1706-15  
DCN: W052.1A.01463  
WO#: 20408.012.001.0502.00

Dear Mr. Stevenson:

The United States Environmental Protection Agency (U.S. EPA) tasked the Weston Solutions, Inc., (WESTON®) Superfund Technical Assessment and Response Team (START) under Technical Direction Document (TDD) 001/1706-15 to support U.S. EPA's activities at the Illinois Gulch RS Site in Breckenridge, Summit County, Colorado. Site activities included providing assistance to the United States Geological Survey (USGS) for synoptic sampling performed at the Illinois Gulch site. This report summarizes site activities performed during September 7, 2017 and includes:

Figure 1 Site Location Map  
Figure 2 Sample Locations Map  
Table 1 Laboratory Analytical Data Summary  
Attachment A – Validated Analytical Data Sheets  
Attachment B - Logbook Notes  
Attachment C – GPS Coordinates, Illinois Gulch Sampling Locations

## **SITE DESCRIPTION**

The Illinois Gulch site area is forested with many roadways, houses and multi-unit dwellings that are within close proximity to the town-site of Breckenridge, a popular year-round resort destination approximately 1 mile away. Historic mine remnants in the form of old structures, adits, dumps, etc., are commonplace in the region. Elevation of the site area varies from approximately 10,000 to 10,800 feet above sea level. Illinois Gulch transmits water through the



Mr. Pete Stevenson, OSC  
U.S. EPA

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Illinois Gulch RS Site  
October, 2017

town-site, and includes drainage from mine features. Interaction of Illinois Gulch and water contribution from local mine features is a focus of this study.

## **BACKGROUND**

Gold was discovered along the Blue River in 1859. The town-site of Breckenridge was founded soon after to serve the miners working the placer gold deposits around the area. Hard rock mining soon followed. The Breckenridge mining district is credited with production of about one million troy ounces of gold. Historic mining operations in Summit County have created preferential pathways for ground water to interact with mineralized mine workings that may contribute contamination to surface waters. Water interaction with sulfide mineralization, inherent in mine remnants, produces an acidic solution (sulfuric acid) that removes heavy metals from the rock materials, and deposits into waterways and groundwater supplies rendering the waters harmful to human health and the environment.

The USGS designed a synoptic sampling event to be performed along a segment of the Illinois Gulch drainage pathway. This segment incorporates water contributions from observed mine features including the Willard mine adits 1 and 2, Willard tailings pile, Cally mine adit, and other upgradient shafts and dumps, as well as additional unidentified mine remnants. The goal of the study is to better understand groundwater interactions with historic mining remnants, and their contribution to the degradation of surface waters in Illinois Gulch. Weather conditions during the synoptic sampling event included clear sunny skies, dry, with an approximately 75° F ambient temperature.

## **SITE ACTIVITIES**

Synoptic sampling is the collection of samples from many locations during a short period of time, typically a few hours. Thus, it is like a "snapshot" of the changes along a stream at a given point in time. Thirty-one surface water sampling locations along drainage pathways associated with Illinois Gulch were sampled by the USGS for this synoptic event during a 4-hour, 10-minute period (Figure 2). Bulk water samples were collected into ½ -gallon poly containers, and hand delivered by EPA to START at an on-site location for dissemination into appropriate sample bottles for laboratory analysis. Sample filtration and preservation was performed on site by START, as appropriate, in accordance with laboratory protocol. Sample analysis was performed by ESC Lab Sciences, Mount Juliet, Tennessee.

In addition to a synoptic sampling event, START assisted the USGS in assembling and disassembling tracer injection equipment employed during the synoptic sampling event, in an effort to determine shallow groundwater and surface water flow characteristics. A sodium bromide solution was released into surface waters at the Willard #1 adit and allowed to infiltrate into the shallow groundwater. Sample analysis for that study was performed by USGS.



Mr. Pete Stevenson, OSC  
U.S. EPA

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Illinois Gulch RS Site  
October, 2017

## CONCLUSIONS

Sample analysis associated with the synoptic sampling event were analyzed for Total and Dissolved Metals, Alkalinity, Chloride, Fluoride, and Sulfate. Data interpretation will be performed by the USGS. The bromide tracer results will also be interpreted by the USGS.

Very truly yours,

WESTON SOLUTIONS, INC.

A handwritten signature in blue ink that reads "Cordel Schmidt".

Cordel Schmidt  
START Project Leader

Attachment A – Validated Analytical Data Sheets  
Attachment B - Logbook Notes  
Attachment C – GPS Coordinates, Illinois Gulch Sampling Locations

cc: Robert Reed, Project Manager  
START DCN File



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## **Attachment A**

### **Validated Analytical Data Sheets**



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## **Attachment B**

### **Logbook Notes**



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## **Attachment C**

**Attachment C – GPS Coordinates, Illinois Gulch Sampling Locations**



*Rite in the Rain.*  
ALL-WEATHER  
**JOURNAL**  
No 391FX

ILLINOIS GULCH

0001/1706-15  
20408.012.001.0502.00

INCH



1  
2 Name \_\_\_\_\_

Address \_\_\_\_\_

3 Phone \_\_\_\_\_

4 Project \_\_\_\_\_

5 IF FOUND:

CORDEL SCHMIDT  
720-474-1492



RiteintheRain.com

CONTENTS

PAGE

REFERENCE

DATE

		303-786-1639 call
	PETE STEVENSON, EPA OSC	303-332-6799 OFF
		720-684-7281 CALL
	ROB FUNKEL, USGS	303-541-3013 OFF

7-7-17

0730 CORDEL SCHEMIST DEPART FOR  
BRECKENRIDGE TO MEET

BOB RUNKEL, USGS, AND  
PETE STEVENSON, OSC AT THE  
BRECKENRIDGE ICE PLANT. WILL  
DEPART TO SITE AREA FROM  
THERE.

1003 ARRIVE AT SITE. GROUP ABOVE  
MOBILIZE TO LOCATION W-1, THE  
WILLARD ADIT #1. COLLECT  
PH/CONDUCTIVITY/TEMPERATURE OF  
WATERS FLOWING FROM THAT LOCATION  
AND FROM SEVERAL DOWNSTREAM  
LOCATIONS AS WE WALKED  
DOWNSTREAM INSPECTING FLOW PATH  
TO STATION ILL-2126.

1330 COMPLETED TOUR. BOB RUNKEL  
AND C. SCHEMIST TOUR OTHER WIND  
LOCATIONS AT SITE AREA.

1420 TOUR COMPLETE.

*[Signature]*

7-7-17 CONT.

PROB SOFT TRACEABLE INPUT BELOW  
W1 ADIT FLOW.

FILTER SAMPLES WITH 1.5MM FILTER  
FRANCH DRIPS UNDER BLUE HOPE RA  
THAT DRAIN INTO ROAD DITCH. FLOW  
FROM ORIGINAL ILLINOIS GULCH?  
(NOTE ILLINOIS GULCH HAS BEEN  
MOVED BY DEVELOPER WHO BUILT  
HOUSES IN AREA).

1425 ACTIVITY NEEDS PROPOSED BY  
PETE STEVENSON AND BOB RUNKEL;  
FOR SYNOPSIS SAMPLING EVENT  
- LIKELY TO BE PERFORMED IN  
LATE AUGUST TO OCTOBER TIME FRAME?

- o 2 SAMPLERS (USGS)
- o 1 PUMP/DELIVERY (SOPE/GR)
- o 1 LOG-IN, PH, COND (START)
- o 2 FILTER, PROCESS SAMPLES FOR LAB  
(TAG, COC, ETC) - (START)

ANTICIPATE APPROX 12 SAMPLES/HR,  
APPROX 3 HOURS. [POSSIBLY  
UTILIZE 2 START PEOPLE].

1640 ARRIVE DENVER OFFICE.

*[Signature]*

9-1-17 FRIDAY

0815 START - CORDEL SPEKE TO USGS -  
ROB RUKKEL. RUKKEL INDICATED:  
TUESDAY EVENING (9/5) - BEGIN  
TRACER TEST, START TO BE ON SITE  
~ NOON TO ASSIST IN MIXING BR  
SALT AND SET UP OPERATIONS  
FOR SYNOPSIS EVENT.

WEDNESDAY (9/6) - USGS TO  
SET UP AUTO SAMPLERS. NO NEED  
FOR START ASSISTANCE.

THURSDAY (9/7) - SYNOPSIS SAMPLING  
EVENT TO BE PERFORMED.  
MINIMUM 2 PERSONS FROM START  
TO ASSIST. ACTIVITIES TO BEGIN  
AT APPROXIMATELY 0900.

*[Signature]*

9-5-17 TUESDAY

0805 START CORDEL SCHMIDT DEPART  
OFFICE FOR SITE IN BRECKENRIDGE, CO.  
1008 MEET USGS ROB RUKKEL AT  
THE SITE. DISCUSS TODAY/SITE  
ACTIVITIES. WEATHER IS CLEAR SKIES,  
7 MPH WIND, DRY, SUNNY, APPROX  
70°F.

1538 HAND CARRIED ALL TRACER EQUIPMENT  
TO THE WILLARD ADIT #1. MIXED  
BROMIDE SOLUTION AND PURED INTO  
TANK, SET UP PUMPING MECHANISM, ETC.  
C. SCHMIDT OFFSITE. R. RUKKEL  
REMAINS ON SITE TO FINISH DETAILS.

1730 AT OFFICE, DISCUSSED THURSDAY'S  
SITE OPERATIONS WITH OSC-STEVENSON.  
START TO HAVE 3 TOTAL PEOPLE ON SITE  
TO ASSIST WITH SAMPLING.

*[Signature]*  
RUKKEL

9-7-17 THURSDAY

0700 START CORDAL SCHMIDT AND  
ELLIOTT PERI DEPART OFFICE FOR  
SITE.

0848 ARRIVE AT SITE. MEET

PAUL STEVENSON EPA-OSC,

ROB RUNKEL, USGS

PHIL, USGS

DAN WICKOPEZ, TECHLAW ALSO ARRIVE

ON SITE TO ASSIST IN OPERATIONS.

WEATHER IS CLEAR SKIES, CALM  
WIND, DRY. EXPECT TEMP APPROX  
75° F TODAY

C. SCHMIDT CONDUCT SITE

SAFETY MEETING. DISCUSS WASTEWATER  
ROUTE, SLIP/TRIP/FALL,  
PERISTALTIC PUMP OPERATION.

0910 PLAN IS USGS WILL OBTAIN

WATER SAMPLES, EPA WILL  
TRANSFER SAMPLES TO START.

START IS SET UP WITH AWWIWA,

TABLE, PERISTALTIC PUMP, PH METER  
AT THE SAWMILL STATION MUSEUM,  
OUTDOORS.

*[Signature]*

9-7-17 CONTS

START PROCESSING SAMPLES (BULK  
IN 1/2 GALLON MILK JUGS - UNWASHED)

INTO SAMPLE BOTTLES, FILTER  
AND ACIDIFY AS REQUIRED.

SAMPLE ANALYSIS:

TOTAL CATIONS (Al, As, Ba, Be, Ca, Cd,  
Co, Cr, Fe, K, Mg, Mn,  
Na, Ni, Pb, Se, Zn)

DISSOLVED CATIONS (AS ABOVE)

DISSOLVED ANIONS (Cl, SO<sub>4</sub>, F)

ALKALINITY

BROMIDE (THESE TO BE HANDLED/  
ANALYZED BY USGS),

1705 START OFFSITE.

1855 START AT OFFICE. SAMPLES  
ARE IN OFFICE, ICED.

NOTE THAT SAMPLES OBTAINED

FOR BROMIDE ANALYSIS WERE

RELINQUISHED TO ROB RUNKEL

WHILE AT THE SITE. USGS TO  
ANALYZE THOSE SAMPLES.

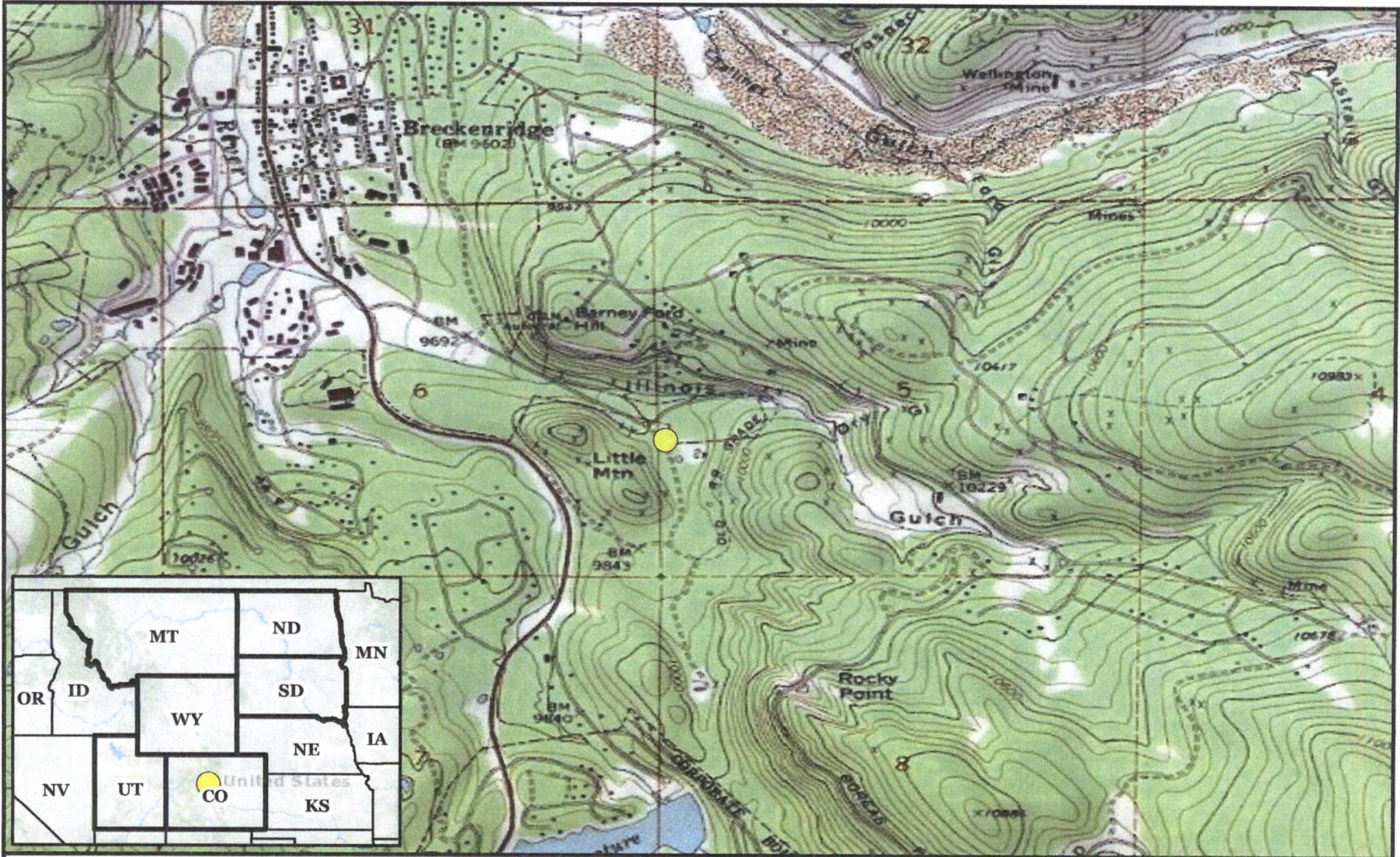
*[Signature]*

9.8.17

SAMPLES WERE SHIPPED VIA  
FEDEX FOR LAB ANALYSIS TO:FESC LAB SCIENCES  
12065 LEBANON RD.  
MOUNT JULIET, TN, 37122A handwritten signature in blue ink, appearing to read 'L. Schmidt', is written diagonally across the bottom right of the page.

Table 2  
 GPS Coordinates for Sample Locations - Illinois Gulch  
 USGS data source  
 Current Date: October 25, 2017

Iron Springs Sites									
Sites sampled on 7 September 2017, Iron Springs and vicinity, near Breckenridge, CO									
<u>I. Iron Springs Reach</u>									
							From Garmin - Zone 13 S (NAD83)		WP
SiteID	Proximal EPA Site	Dist [m]	Source	SiteDescription	Easting	Northing	Altitude [m]		
IS-004	IG-13	4	STR	Willard #1 at flume	411502	4369297	3000 m	2	
IS-051		51	STR	Iron Springs below Willard #1	411481	4369334	3006 m	8	
IS-075		75	STR	Iron Springs above Willard #2	411472	4369352	2991 m	12	
IS-135		135	STR	Diffuse flow in sedges	411426	4369368	2999 m	20	
IG-16			RBI	Willard Adit 2	411491	4369381	2985	IG-16	
IS-137		137	RBI	flow from Willard #2 and other sources	411426	4369366	2998 m	21	
IS-157		157	STR	channel in sedges on left side of berm	411410	4369369	2999 m	27	
IS-162	IG-11	162	LBI	channel w/ Ulothrix that starts at toe of mine dump	411410	4369364	2997 m	28	
IS-167	IG-10	167	STR	outlet of small pond below confluence of stream and LBI	411400	4369367	2994 m	29	
IS-170		170	RBI	diffuse flow through sedges on right side of berm	411398	4369370	2994 m	30	
IS-187		187	STR		411383	4369373	2994 m	32	
IS-200		200	LBI	water from left of dump, cally spr area?	411370	4369356	3001 m	36	
IS-236		236	STR	Iron Springs below ponded area	411345	4369385	3003 m	40	
IS-281		281	STR		411312	4369401	2995 m	48	
WP112	IG-197???		RBI	inflow from robbers nest area (update this desc consist w/ notes/photos)	411344	4369458	9865 ft	112	
IS-322	IG-09	322	STR	Iron Springs below Bright Hope	411284	4369426	3000 m	51	
IS-380		380	STR		411244	4369464	2998 m	60	
IS-442	IG-05	442	STR	IS above Little Mtn, downstream end of culvert under upstream end of Brookside Lane	411194	4369499	2992 m	68	
IS-510	IG-04	510	STR	~WP78, IS Below L Mtn	411140	4369534	2988 m	78	
IS-576		576	STR	downstream end of culvert under downstream end of Brookside Lane	411086	4369567	2991 m	87	
IS-618	TBD		STR		411056	4369589	2986 m	94	
IS-657		657	STR	Iron Springs at Mouth	411028	4369611	2983 m	100	
ILL-2090	IG-03	660	RBI	Illinois Gulch upstream of Iron Springs Gulch Confluence, near IG-03	411061	4369615	2974	251	
ILL-2147	IG-02	717	STR	Illinois Gulch downstream of Iron Springs Gulch Confluence on upstream side of Boreas Pass Road, near IG-02	411008	4369623	2974	257	
<u>II. Little Mountain</u>									
							From Garmin - Zone 13 S (NAD83)		WP
SiteID	Proximal 2013/2015 Site	Dist [m]	Source	SiteDescription	Easting	Northing	Altitude [m]		
LM-03	IG-07	3	STR	Little Mtn at temp flume	411239	4369442	2998 m	102	
LM-13	IG-08	13	LBI	diffuse, iron stained inflow	411231	4369446	2994 m	104	
LM-30		30	STR	Little Mtn at permanent flume	411222	4369457	2992 m	107	
LM-74	IG-06	74	STR	Little Mtn at upstream end of road culvert	411188	4369483	2993 m	111	
<u>II. Cally &amp; Ponds</u>									
							From Garmin - Zone 13 S (NAD83)		WP
SiteID	Proximal 2013/2015 Site	Dist [m]	Source	SiteDescription	Easting	Northing	Altitude [m]		
IG-CAL				Cally spring	411407	4369184	2996	16	
IG-18	IG 18?			one of the pond inlets - see notes	411416	4369221	9852 ft	114	
IG-17	IG 17			pond outlet	411418	4369263	9854 ft	113	



Coordinate System: GCS WGS 1984  
Datum: WGS 1984

Source:  
Site Location: Georeferenced Aerial (2017)  
Background: ESRI USA Topo Maps (2017)

**Legend:**

 Site Location

0 0.25 0.5 1 Miles



Prepared for:  
U.S. EPA - Region 8

Contract: EP-S8-13-01  
TO/TDD: 0001/1706-15

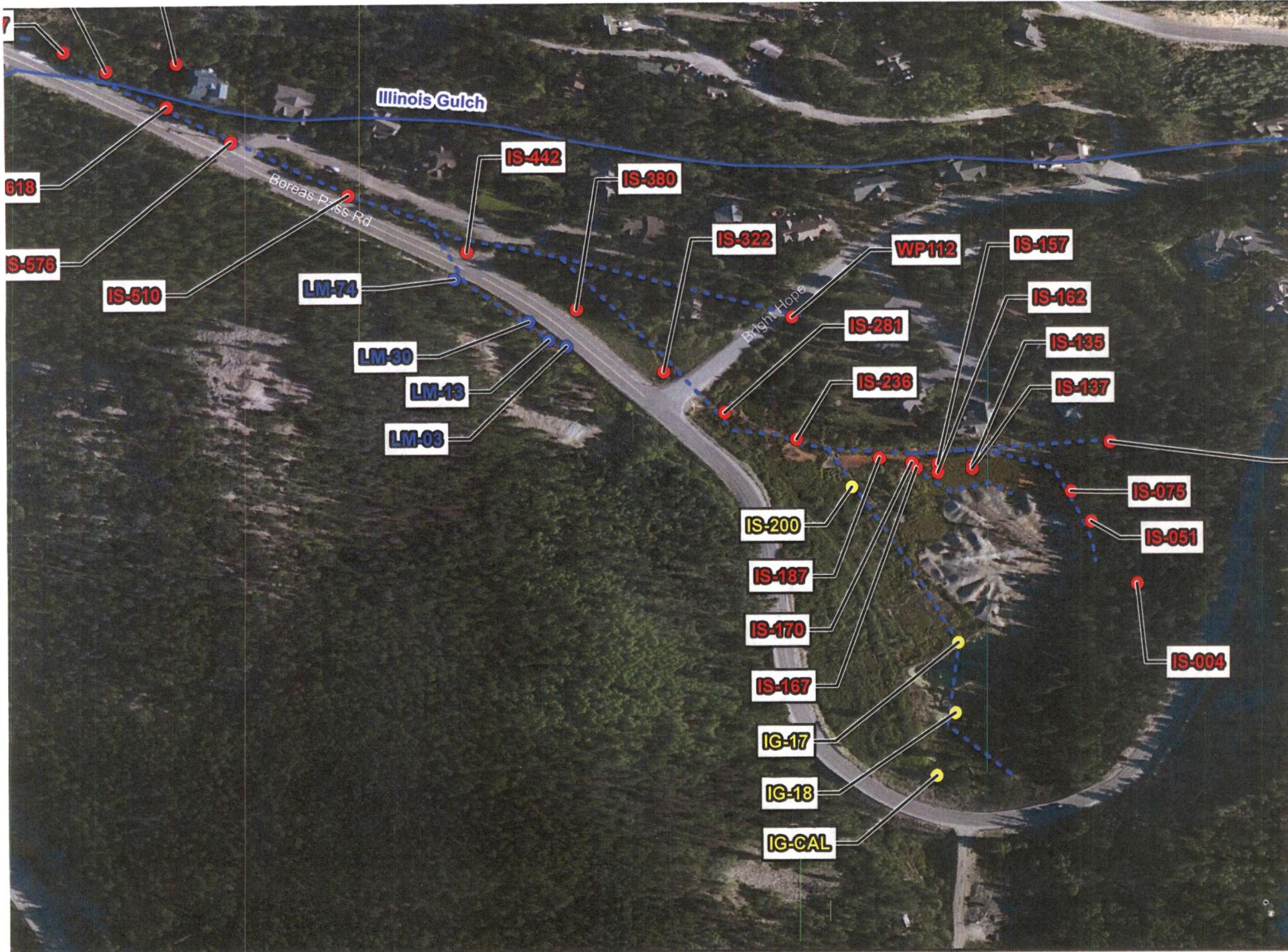


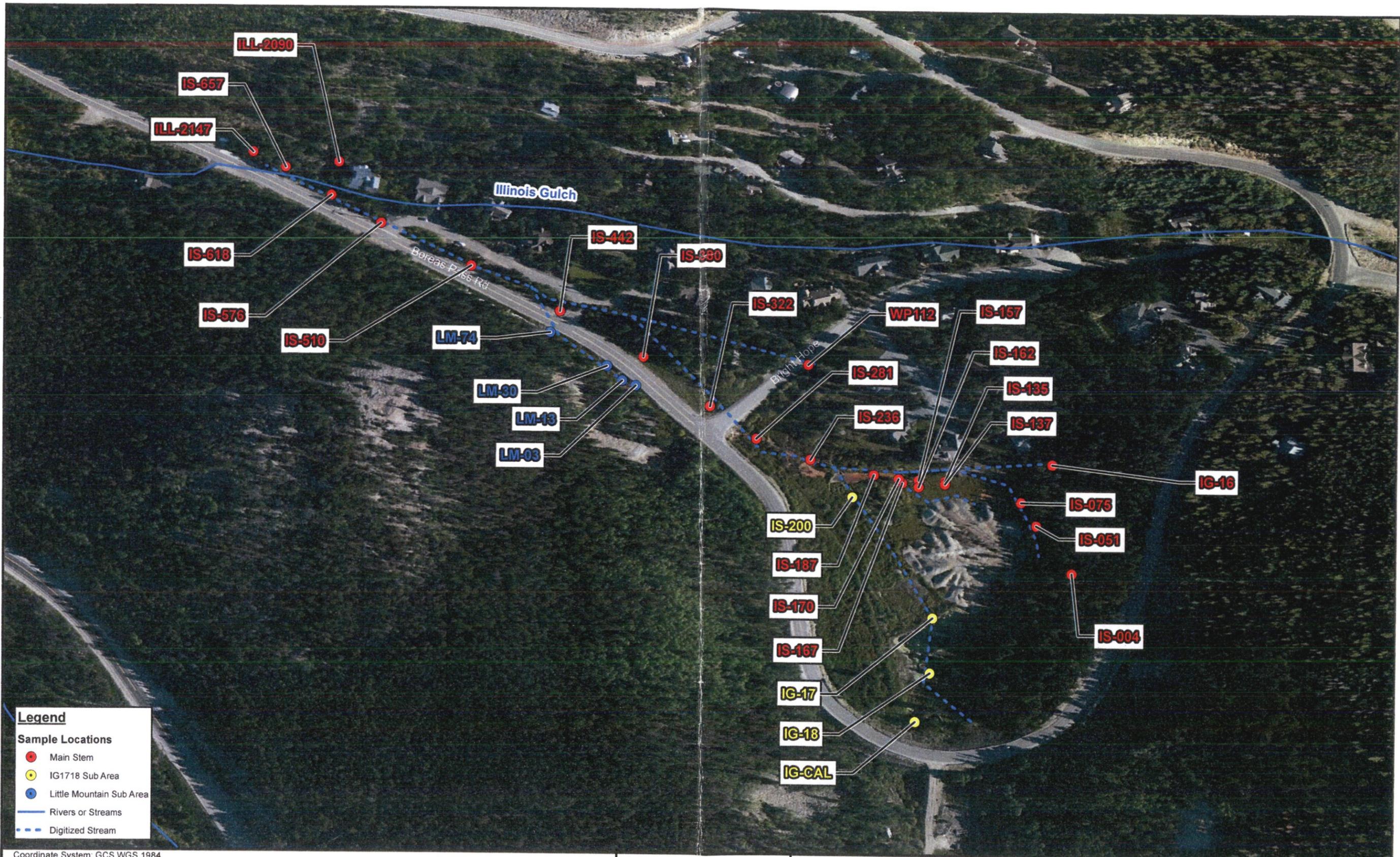
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START IV  
Suite 100  
1435 Garrison St.  
Lakewood, CO



**FIGURE 1**  
**SITE LOCATION MAP**  
**ILLINOIS GULCH RS SITE**  
**BRECKENRIDGE, COLORADO**

Date: October 2017





**Legend**

**Sample Locations**

- Main Stem
- IG1718 Sub Area
- Little Mountain Sub Area
- Rivers or Streams
- - - Digitized Stream

Coordinate System: GCS WGS 1984  
 Datum: WGS 1984  
 Source:  
 Sample Locations: START GPS Weston, 2017  
 Mines: ESAT, 2015  
 Mine Features: ESAT, 2015  
 Rivers or Streams: NHD, 2008  
 Digitized Stream: START-Weston, Digitized from Google Earth Imagery, 2014  
 Waste Material Piles: START-Weston, Digitized from Google Earth Imagery, 2014  
 Background: ESRI World Imagery (NAIP - 9/10/2015)



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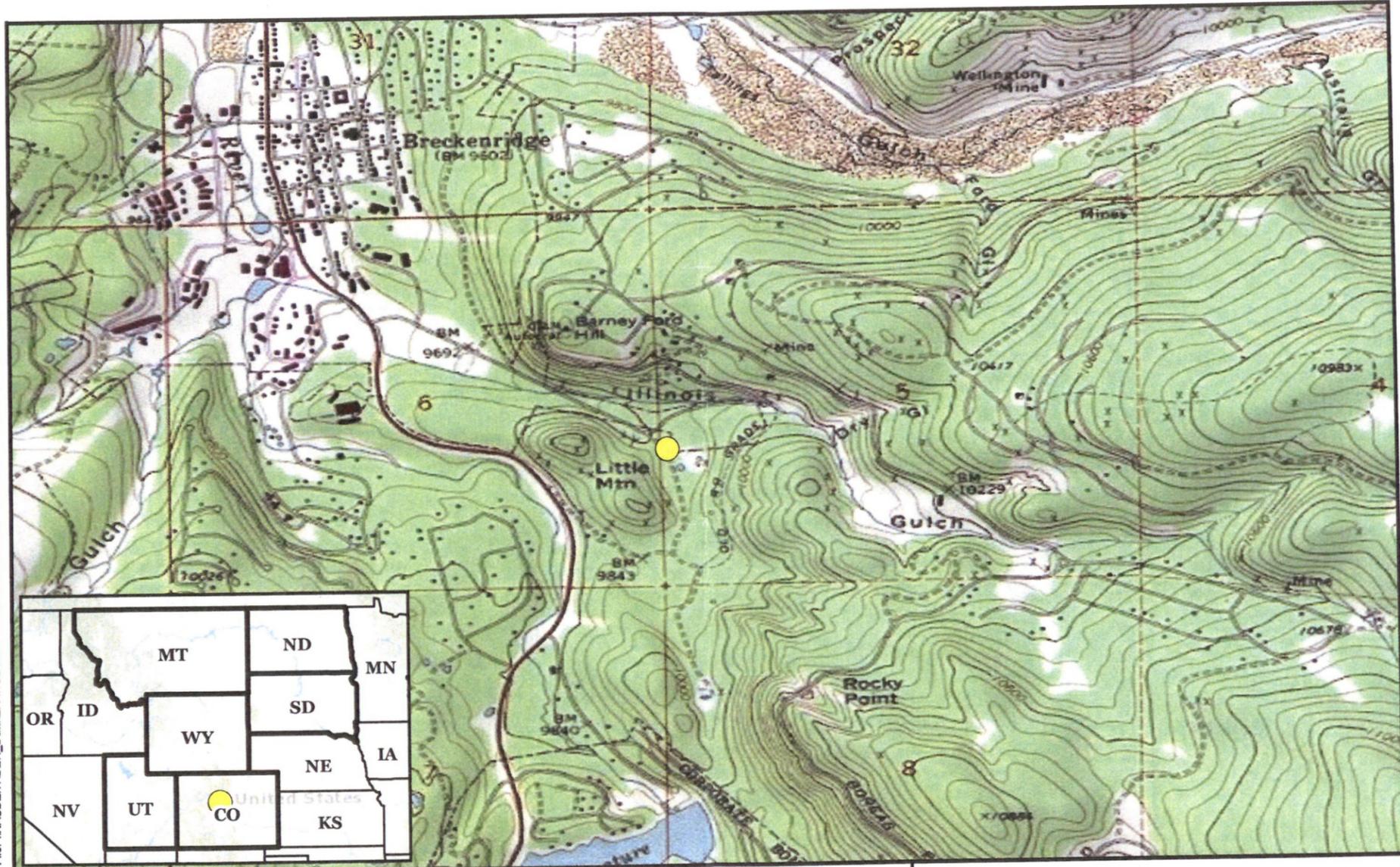
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 1435 Garrison St.  
 Lakewood, CO



**FIGURE 2**  
**SAMPLE LOCATION MAP**  
**ILLINOIS GULCH RS SITE**  
**BRECKENRIDGE, COLORADO**

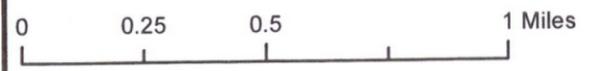
Date: October 2017

File: \\NASDEN\IDEN\_Data\EPATDD\0001-1706-15 Illinois Gulch RS\3- Execution2 - Maps-Figures\Maps\Figure1\_SiteLocation\_Landscape.mxd



Coordinate System: GCS WGS 1984  
Datum: WGS 1984

Source:  
Site Location: Georeferenced Aerial (2017)  
Background: ESRI USA Topo Maps (2017)



**Legend:**  
● Site Location



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**FIGURE 1  
SITE LOCATION MAP  
ILLINOIS GULCH RS SITE  
BRECKENRIDGE, COLORADO**

Date: October 2017

**Table 1**  
**Illinois Gulch Synoptic Sampling Event**  
September 17, 2017

Sample ID:			ILL-2090		ILL-2147		IS-657		IS-442		IS-442D		IS-618		IS-576		IS-510		IS-380	
Date Collected:			09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017	
Method	Analyte	Units	Result	Qualifier																
200.7	ALUMINUM	mg/l	<0.2		<0.2		<0.2		1.28		1.27		0.229		0.103	J	0.193	J	1.59	
200.7	ARSENIC	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	BARIUM	mg/l	0.117		0.11		0.084	O1	0.0416		0.0429		0.0802		0.0715		0.0751		0.0331	
200.7	BERYLLIUM	mg/l	<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.002	
200.7	CADMIUM	mg/l	<0.002		0.00131	J	0.00422		0.0143		0.0147		0.00423		0.00526		0.00565		0.0176	
200.7	CALCIUM	mg/l	30.7		38.9		55.4	O1	69		71.5		52.9		57.8		59.7		71.4	
200.7	COBALT	mg/l	<0.01		<0.01		0.00373	J	0.0113		0.0117		0.00363	J	0.00455	J	0.00513	J	0.0146	
200.7	COPPER	mg/l	<0.01		<0.01		0.0117		0.0738		0.0744		0.0269		0.0175		0.0215		0.0977	
200.7	IRON	mg/l	<0.1		0.155		0.421		3.38		3.33		1.05		0.741		0.96		4.3	
200.7	LEAD	mg/l	0.00201	B J	0.00342		0.0064	J	0.054		0.0514		0.0156	B	0.0103	J	0.0147	B	0.0646	
200.7	MAGNESIUM	mg/l	6.12		7.91		11.4	O1	15.9		16.4		10.9		12.1		12.6		16.6	
200.7	MANGANESE	mg/l	0.00531	J	0.162		0.536	O1	1.52		1.59		0.537		0.696		0.752		1.9	
200.7	NICKEL	mg/l	<0.01		<0.01		0.00596	J	0.0149		0.0157		0.0061	J	0.00737	J	0.00792	J	0.0182	
200.7	POTASSIUM	mg/l	0.526	J	0.734	J	1.17		1.38		1.42		1.16		1.16		1.23		1.4	
200.7	SELENIUM	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	SODIUM	mg/l	2.23		3.53		6.31	O1	7.81		8.16		6.08		6.49		6.7		8.34	
200.7	ZINC	mg/l	0.0923		0.418		1.22	O1	3.67		3.79		1.23		1.52		1.69		4.41	
200.8	CALCIUM,DISSOLVED	mg/l	28.2		34.7		51.9	V	65.4		67.7		47.8		54		55.9		68.8	
200.8	MAGNESIUM,DISSOLVED	mg/l	6.05		7.54		11.3		15.9		16.6		10.4		12		12.6		16.9	
200.8	POTASSIUM,DISSOLVED	mg/l	0.514	J	0.716	J	1.23		1.41		1.48		1.1		1.21		1.27		1.5	
200.8	SODIUM,DISSOLVED	mg/l	2.23		3.42		6.48		8.18		8.51		5.96		6.63		6.94		8.71	
200.8	ALUMINUM,DISSOLVED	mg/l	0.0206	J	0.0226	J	0.0513	J	0.0327	J	0.0281	J	0.0323	J	0.0454	J	0.243		0.0684	J
200.8	ARSENIC,DISSOLVED	mg/l	0.000236	J	0.00025	J	0.000283	J	0.000413	J	0.000368	J	0.00024	J	0.000293	J	0.000565	J	0.000414	J
200.8	BARIUM,DISSOLVED	mg/l	0.11		0.0999		0.0796		0.0398		0.0401		0.072		0.0683		0.0707		0.033	
200.8	BERYLLIUM,DISSOLVED	mg/l	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
200.8	CADMIUM,DISSOLVED	mg/l	0.000453	J	0.00126		0.00412		0.014		0.0141		0.00376		0.00511		0.00558		0.0175	
200.8	COBALT,DISSOLVED	mg/l	0.00035	J	0.00104	J	0.00363		0.0118		0.0121		0.00379		0.00512		0.00517		0.0156	
200.8	COPPER,DISSOLVED	mg/l	0.00045	J	0.00206		0.0036		0.01		0.00904		0.0041		0.00351		0.0143		0.0274	
200.8	IRON,DISSOLVED	mg/l	<0.1		<0.1		0.0307	J	0.402		0.377		0.0267	J	<0.1		0.684		0.943	
200.8	LEAD,DISSOLVED	mg/l	<0.001		<0.001		<0.001		<0.001		<0.001		0.000479	J	<0.001		0.00828		0.00212	
200.8	MANGANESE,DISSOLVED	mg/l	0.00472		0.154		0.541	V	1.58		1.61		0.51		0.713		0.755		2.03	
200.8	NICKEL,DISSOLVED	mg/l	<0.001		0.00215		0.00713		0.0151		0.0153		0.00498		0.00679		0.00848		0.0185	
200.8	SELENIUM,DISSOLVED	mg/l	<0.002		<0.002		<0.002		<0.002		<0.002		0.000353	J	0.00032	J	0.000377	J	0.000344	J
200.8	ZINC,DISSOLVED	mg/l	0.0805		0.347		1.14	V	3.47		3.54		1.07		1.39		1.55		4.36	
2320 B-2011	ALKALINITY	mg/l	90.7		86.4		73.1		26		24.7		71.9		66.7		65.9		16.7	J
300	CHLORIDE	mg/l	3.8		5.58		10.2		12.9		12.8		10.2		11.2		11.1		13.2	
300	FLUORIDE	mg/l	0.105		0.121		0.145		0.212		0.211		0.0423	J	0.0581	J	0.0547	J	0.0883	J
300	SULFATE	mg/l	7.75		34		95.8		205		187		95.2		120		121		221	

B: The same analyte is found in the associated blank. J: The identification of the analyte is acceptable; the reported value is an estimate. O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria.

P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit. V: The sample concentration is too high to evaluate accurate spike recoveries.

- Shaded indicates contaminant observation.

Table 1, continued  
 Illinois Gulch Synoptic Sampling Event  
 September 17, 2017

Client Sample ID			IS-322		IS-281		IS-236		IS-187		IS-187D		IS-167		IS-157		IS-135	
Date Collected			09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017	
Method	Analyte	Units	Result	Qualifier														
200.7	ALUMINUM	mg/l	1.75		2.07		1.91		2.96		2.94		2.96		2.29		3.41	
200.7	ARSENIC	mg/l	<0.01		<0.01		0.0073	J	<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	BARIUM	mg/l	0.0335		0.0324		0.0315		0.0191		0.0186		0.0176		0.0217		0.0255	
200.7	BERYLLIUM	mg/l	0.000797	J	0.000922	J	0.000864	J	0.00134	J	0.00137	J	0.00122	J	0.00107	J	0.00191	J
200.7	CADMIUM	mg/l	0.0188		0.0184		0.018		0.0262		0.0258		0.026		0.0216		0.0209	
200.7	CALCIUM	mg/l	74		72.3		70.9		62.5		62.2		59		61.4		63.5	
200.7	COBALT	mg/l	0.0161		0.0159		0.0156		0.0227		0.0224		0.0216		0.0208		0.0271	
200.7	COPPER	mg/l	0.113		0.124		0.118		0.174		0.171		0.17		0.107		0.0512	
200.7	IRON	mg/l	4.6		5.47		4.62		6.36		6.34		6.84		4.32		8.49	
200.7	LEAD	mg/l	0.068		0.0809		0.0712		0.115		0.114		0.107		0.104		0.123	
200.7	MAGNESIUM	mg/l	17.2		16.9		16.7		15.3		15.1		14.1		15.3		15.1	
200.7	MANGANESE	mg/l	2.11		2.08		2.03		2.76		2.73		2.59		2.44		2.9	
200.7	NICKEL	mg/l	0.0191		0.0196		0.0184		0.0266		0.0264		0.0255		0.0252		0.0314	
200.7	POTASSIUM	mg/l	1.45		1.41		1.43		1.6		1.6		1.49		1.71		1.84	
200.7	SELENIUM	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	SODIUM	mg/l	8.75		8.62		8.46		10.4		10.3		10.3		13.4		9.68	
200.7	ZINC	mg/l	4.63		4.54		4.45		6.41		6.32		6.32		5.79		7.67	
200.8	CALCIUM,DISSOLVED	mg/l	67.5		63.7		66.9		55.2		58.3		56.2		52.3		56	V
200.8	MAGNESIUM,DISSOLVED	mg/l	16.8		16		16.6		14.3		15.1		14.5		13.8		14.1	
200.8	POTASSIUM,DISSOLVED	mg/l	1.46		1.39		1.45		1.53		1.61		1.55		1.58		1.8	
200.8	SODIUM,DISSOLVED	mg/l	8.82		8.39		8.8		10.2		10.7		10.9		12.7		9.38	
200.8	ALUMINUM,DISSOLVED	mg/l	0.0664	J	0.558		0.213		3.03		3.17		3.14		2.21		3.35	
200.8	ARSENIC,DISSOLVED	mg/l	0.000371	J	0.00106		0.00022	J	0.00237		0.00259		0.00544		0.000507	J	0.000452	J
200.8	BARIUM,DISSOLVED	mg/l	0.0313		0.0296		0.0299		0.0171		0.0176		0.0174		0.0186		0.0229	
200.8	BERYLLIUM,DISSOLVED	mg/l	0.000395	J	0.0006	J	0.000594	J	0.00143		0.00156		0.0015		0.00119		0.00155	
200.8	CADMIUM,DISSOLVED	mg/l	0.0181		0.0177		0.0182		0.0247		0.0263		0.0277		0.02		0.0199	
200.8	COBALT,DISSOLVED	mg/l	0.0163		0.0153		0.0162		0.0219		0.0231		0.0224		0.0192		0.0259	
200.8	COPPER,DISSOLVED	mg/l	0.0505		0.0715		0.0772		0.16		0.167		0.169		0.101		0.0477	
200.8	IRON,DISSOLVED	mg/l	1.17		2.11		1.23		5.94		6.21		6.87		3.87		7.92	
200.8	LEAD,DISSOLVED	mg/l	0.00254		0.0202		0.00801		0.106		0.112		0.109		0.0931		0.113	
200.8	MANGANESE,DISSOLVED	mg/l	2.11		2		2.07		2.66		2.77		2.68		2.23		2.86	V
200.8	NICKEL,DISSOLVED	mg/l	0.0191		0.0189		0.0184		0.0246		0.0261		0.0261		0.0237		0.0292	
200.8	SELENIUM,DISSOLVED	mg/l	0.000391	J	0.000416	J	0.000487	J	0.000441	J	0.000486	J	0.000368	J	<0.002		0.000447	J
200.8	ZINC,DISSOLVED	mg/l	4.45		4.2		4.39		6.15		6.75		6.35		5.5		7.78	
2320 B-2011	ALKALINITY	mg/l	13.9	J	13	J	13.6	J	<20		<20		<20		<20		<20	
300	CHLORIDE	mg/l	13.2		13.3		13.3		16.9		16.7		16.6		15.6		20.2	
300	FLUORIDE	mg/l	0.143		0.151		0.159		0.278		0.274		0.264		0.276		0.358	
300	SULFATE	mg/l	225		227		226		235		230		237		273		310	

B: The same analyte is found in the associated blank. J: The identification of the analyte is acceptable; the reported value is an estimate. O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria.  
 P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit. V: The sample concentration is too high to evaluate accurate spike recoveries.

- Shaded indicates contaminant observation.

Table 1, continued  
Illinois Gulch Synoptic Sampling Event  
September 17, 2017

Client Sample ID			IS-075		IS-051		IS-004		IS-137		IS-162		IS-170		IS-200		WP-112	
Date Collected			09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017	
Method	Analyte	Units	Result	Qualifier														
200.7	ALUMINUM	mg/l	3.09		3.11		3.13		1.8		4.63		1.03		<0.2		<0.2	
200.7	ARSENIC	mg/l	0.0164		0.00982	J	0.0113		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	BARIUM	mg/l	0.0288		0.0274		0.0293		0.0216		0.0108		0.0195		0.0589		0.0928	
200.7	BERYLLIUM	mg/l	0.00146	J	0.00199	J	0.00173	J	0.000747	J	0.00214		<0.002		<0.002		<0.002	
200.7	CADMIUM	mg/l	0.0371		0.0349		0.0379		0.0197		0.0414		0.00459		<0.002		0.00296	
200.7	CALCIUM	mg/l	63.1		59.1		64		53.2		54.3		53.3		85.1		31.4	
200.7	COBALT	mg/l	0.0242		0.0233		0.0246		0.0194		0.0268		0.0142		<0.01		<0.01	
200.7	COPPER	mg/l	0.186		0.179		0.193		0.0889		0.354		0.0191		<0.01		<0.01	
200.7	IRON	mg/l	16.7		13.7		17.3		2.26		5.87		3.55		0.285		<0.1	
200.7	LEAD	mg/l	0.168		0.153		0.167		0.0943		0.134		0.0476		0.00545		<0.005	
200.7	MAGNESIUM	mg/l	14.8		14.4		15.3		14.5		14		15.1		18.6		5.98	
200.7	MANGANESE	mg/l	2.73		2.64		2.8		2.19		3.19		2.13		0.0677		<0.01	
200.7	NICKEL	mg/l	0.0277		0.027		0.0281		0.0222		0.0294		0.0165		<0.01		<0.01	
200.7	POTASSIUM	mg/l	1.55		1.57		1.59		1.94	B	1.68	B	2.14	B	1.39	B	1.02	B
200.7	SELENIUM	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	SODIUM	mg/l	25.7		24.5		6.25		15		6.69		6.52		4.32		4.79	
200.7	ZINC	mg/l	7.5		6.93		7.69		5.09		8.4		2.44		0.0304	J	0.254	
200.8	CALCIUM,DISSOLVED	mg/l	54.3		55.1		53.7		48.4		49.4		48.1		68.7		29.6	
200.8	MAGNESIUM,DISSOLVED	mg/l	13.8		14		13.7		13.5		12.9		13.8		16.4		5.75	
200.8	POTASSIUM,DISSOLVED	mg/l	1.48		1.52		1.48		1.52		1.24		1.73		0.987	J	0.752	J
200.8	SODIUM,DISSOLVED	mg/l	24.1		24.3		5.76		14.3		6.19		5.98		3.83		4.68	
200.8	ALUMINUM,DISSOLVED	mg/l	3		2.97		2.89		1.59		4.05		0.915		0.0213	J	0.0231	J
200.8	ARSENIC,DISSOLVED	mg/l	0.00315		0.0032		0.00326		0.000359	J	0.00294		<0.001		0.000634	J	0.000293	J
200.8	BARIUM,DISSOLVED	mg/l	0.0253		0.0262		0.0257		0.0173		0.00895		0.0161		0.0459		0.0796	
200.8	BERYLLIUM,DISSOLVED	mg/l	0.00163		0.00171		0.00159		0.000875	J	0.00167		0.000405	J	<0.001		<0.001	
200.8	CADMIUM,DISSOLVED	mg/l	0.0348		0.0359		0.0353		0.02		0.0419		0.00468		<0.001		0.00332	
200.8	COBALT,DISSOLVED	mg/l	0.0228		0.023		0.0227		0.0176		0.0246		0.0129		<0.002		<0.002	
200.8	COPPER,DISSOLVED	mg/l	0.169		0.172		0.167		0.0723		0.359		0.0153		0.000535	J	0.000654	J
200.8	IRON,DISSOLVED	mg/l	10.9		12.7		14.4		2.02		5.31		2.3		0.0235	J	<0.1	
200.8	LEAD,DISSOLVED	mg/l	0.147		0.149		0.142		0.0848		0.12		0.0426		<0.001		<0.001	
200.8	MANGANESE,DISSOLVED	mg/l	2.58		2.61		2.56		1.84		2.72		1.78		0.0471		0.000533	J
200.8	NICKEL,DISSOLVED	mg/l	0.0259		0.0262		0.0255		0.0213		0.0301		0.016		0.000466	J	0.000866	J
200.8	SELENIUM,DISSOLVED	mg/l	0.000446	J	0.000503	J	0.000332	J	0.000336	J	0.000642	J	<0.002		0.00134	J	0.000321	J
200.8	ZINC,DISSOLVED	mg/l	7.41		7.85		7.69		5.04		9.21		2.5		0.0162		0.236	
2320 B-2011	ALKALINITY	mg/l	<20		<20		<20		<20		<20		<20		191		93.2	
300	CHLORIDE	mg/l	19.7		19.5		18.4		13.4		19.5		11		5.58		9.43	
300	FLUORIDE	mg/l	0.31		0.312		0.262		0.195		0.338		0.205		0.0594	J	0.0103	J
300	SULFATE	mg/l	275		282		301		299		382		307		94		15.6	

B: The same analyte is found in the associated blank. J: The identification of the analyte is acceptable; the reported value is an estimate. O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria.

P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit. V: The sample concentration is too high to evaluate accurate spike recoveries.

- Shaded indicates contaminant observation.

Table 1, continued  
 Illinois Gulch Synoptic Sampling Event  
 September 17, 2017

Client Sample ID			LM-074		LM-030		LM-013		LM-003		IG-017		IG-018		IG-CAL		IG-016	
Date Collected			09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017		09/07/2017	
Method	Analyte	Units	Result	Qualifier														
200.7	ALUMINUM	mg/l	<0.2		0.0471	J	<0.2		0.0355	J	0.0767	J	<0.2		0.101	J	0.31	
200.7	ARSENIC	mg/l	<0.01		<0.01		0.0128		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	BARIUM	mg/l	0.0944		0.1		0.0159		0.119		0.0598		0.0618	O1	0.0651		0.0131	
200.7	BERYLLIUM	mg/l	<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.002	
200.7	CADMIUM	mg/l	<0.002		0.000741	J	<0.002		<0.002		<0.002		<0.002		<0.002		0.00372	
200.7	CALCIUM	mg/l	45.2		45.4		111		34.1		85.3		88.1		90.7		50	V
200.7	COBALT	mg/l	<0.01		0.00364	J	0.0225		<0.01		<0.01		<0.01		<0.01		0.014	
200.7	COPPER	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		0.0106	
200.7	COPPER	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		0.0106	
200.7	IRON	mg/l	0.52		1.41		22.4		<0.1		0.475		0.0424	J	0.107		14.7	
200.7	LEAD	mg/l	<0.005		<0.005		0.00275	J	<0.005		0.00212	J	0.0027	J	<0.005		0.0259	
200.7	LEAD	mg/l	<0.005		<0.005		0.00275	J	<0.005		0.00212	J	0.0027	J	<0.005		0.0259	
200.7	MAGNESIUM	mg/l	9.82		9.81		25.6		6.81		19.1		18.2		18.9		14.7	
200.7	MANGANESE	mg/l	0.428		0.481		3.2		0.00318	J	0.0569		0.0146		0.00367	J	1.42	
200.7	MANGANESE	mg/l	0.428		0.481		3.2		0.00318	J	0.0569		0.0146		0.00367	J	1.42	
200.7	NICKEL	mg/l	<0.01		<0.01		0.0222		<0.01		<0.01		<0.01		<0.01		0.0187	
200.7	POTASSIUM	mg/l	1.32	B	1.32	B	2.41	B	1.11	B	1.45	B	1.47	B	1.36	B	1.93	B
200.7	SELENIUM	mg/l	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01	
200.7	SODIUM	mg/l	5.39		5.53		3.17		6.01		4.33		3.76		3.71		5.07	
200.7	SODIUM	mg/l	5.39		5.53		3.17		6.01		4.33		3.76		3.71		5.07	
200.7	ZINC	mg/l	0.652		0.724		4.56		0.128		0.0316	J	0.0143	J	0.0117	J	2.85	
200.8	CALCIUM,DISSOLVED	mg/l	44.2		42.9		94.1		30.8		72		77.6	V	75.9		45.4	
200.8	MAGNESIUM,DISSOLVED	mg/l	10		9.64		24.1		6.19		17.8		17.6		18.3		14.1	
200.8	POTASSIUM,DISSOLVED	mg/l	1.02		1.02		1.97		0.795	J	1.07		1.05		1.04		1.56	
200.8	POTASSIUM,DISSOLVED	mg/l	1.02		1.02		1.97		0.795	J	1.07		1.05		1.04		1.56	
200.8	SODIUM,DISSOLVED	mg/l	5.43		5.34		2.91		5.52		3.93		3.54		3.52		4.84	
200.8	SODIUM,DISSOLVED	mg/l	5.43		5.34		2.91		5.52		3.93		3.54		3.52		4.84	
200.8	ALUMINUM,DISSOLVED	mg/l	0.0266	J	0.0223	J	0.0302	J	0.0201	J	<0.1		<0.1		0.0208	J	0.229	
200.8	ALUMINUM,DISSOLVED	mg/l	0.0266	J	0.0223	J	0.0302	J	0.0201	J	<0.1		<0.1		0.0208	J	0.229	
200.8	ARSENIC,DISSOLVED	mg/l	0.000338	J	0.00054	J	0.00819		0.000248	J	<0.001		<0.001		<0.001		0.00215	
200.8	ARSENIC,DISSOLVED	mg/l	0.000338	J	0.00054	J	0.00819		0.000248	J	<0.001		<0.001		<0.001		0.00215	
200.8	BARIUM,DISSOLVED	mg/l	0.0835		0.0853		0.0137		0.0948		0.0477		0.0522		0.0533		0.0113	
200.8	BARIUM,DISSOLVED	mg/l	0.0835		0.0853		0.0137		0.0948		0.0477		0.0522		0.0533		0.0113	
200.8	BERYLLIUM,DISSOLVED	mg/l	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		0.000284	J
200.8	BERYLLIUM,DISSOLVED	mg/l	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		0.000284	J
200.8	CADMIUM,DISSOLVED	mg/l	0.000748	J	0.000831	J	<0.001		0.000933	J	<0.001		<0.001		<0.001		0.00374	
200.8	CADMIUM,DISSOLVED	mg/l	0.000748	J	0.000831	J	<0.001		0.000933	J	<0.001		<0.001		<0.001		0.00374	
200.8	COBALT,DISSOLVED	mg/l	0.00248		0.00279		0.0203		<0.002		<0.002		<0.002		<0.002		0.013	
200.8	COBALT,DISSOLVED	mg/l	0.00248		0.00279		0.0203		<0.002		<0.002		<0.002		<0.002		0.013	
200.8	COPPER,DISSOLVED	mg/l	0.000381	J	0.000465	J	<0.001		0.000559	J	0.000389	J	0.000276	J	0.000376	J	0.00699	
200.8	COPPER,DISSOLVED	mg/l	0.000381	J	0.000465	J	<0.001		0.000559	J	0.000389	J	0.000276	J	0.000376	J	0.00699	
200.8	IRON,DISSOLVED	mg/l	0.104		0.94		17.1		<0.1		0.0186	J	<0.1		<0.1		13.2	
200.8	IRON,DISSOLVED	mg/l	0.104		0.94		17.1		<0.1		0.0186	J	<0.1		<0.1		13.2	
200.8	LEAD,DISSOLVED	mg/l	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		0.0175	
200.8	LEAD,DISSOLVED	mg/l	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		0.0175	
200.8	MANGANESE,DISSOLVED	mg/l	0.388		0.417		2.77		0.00225	J	0.0322		0.0101		<0.005		1.23	
200.8	MANGANESE,DISSOLVED	mg/l	0.388		0.417		2.77		0.00225	J	0.0322		0.0101		<0.005		1.23	
200.8	NICKEL,DISSOLVED	mg/l	0.00323		0.00334		0.0205		0.000506	J	0.000488	J	<0.001		0.000756	J	0.0184	
200.8	NICKEL,DISSOLVED	mg/l	0.00323		0.00334		0.0205		0.000506	J	0.000488	J	<0.001		0.000756	J	0.0184	
200.8	SELENIUM,DISSOLVED	mg/l	<0.002		<0.002		<0.002		<0.002		0.00206		0.0032		0.00395		<0.002	
200.8	SELENIUM,DISSOLVED	mg/l	<0.002		<0.002		<0.002		<0.002		0.00206		0.0032		0.00395		<0.002	
200.8	ZINC,DISSOLVED	mg/l	0.626		0.699		4.67		0.127		0.0121		0.0104	J	0.00906	J	3.05	
200.8	ZINC,DISSOLVED	mg/l	0.626		0.699		4.67		0.127		0.0121		0.0104	J	0.00906	J	3.05	
2320 B-2011	ALKALINITY	mg/l	84.3		84.9		46.7		92.4		188		215		222		8.1	B J
300	CHLORIDE	mg/l	9.8		10.2		7.72		10.3		5.7		2.34		2.09		5.27	
300	FLUORIDE	mg/l	0.0229	J	0.0239	J	0.0888	J	0.0117	J	0.0622	J	0.044	J	0.0381	J	0.19	
300	FLUORIDE	mg/l	0.0229	J	0.0239	J	0.0888	J	0.0117	J	0.0622	J	0.044	J	0.0381	J	0.19	
300	SULFATE	mg/l	80.6		79.7		348		25.6		97.4		79.7		82.3		188	

B: The same analyte is found in the associated blank. J: The identification of the analyte is acceptable; the reported value is an estimate. O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria.  
 P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit. V: The sample concentration is too high to evaluate accurate spike recoveries.

- Shaded indicates contaminant observation.